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LISTS OF SPECIES

Orchidaceae, Uttarakhand, Western Himalaya, India.

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Abstract: A checklist of 237 species of orchids recorded from the state of Uttarakhand, India, is provided. Of these 127 are terrestrial, 99 epiphytic and 11 saprophytic. The present study shows that *Poneorchis nana* (King & Pantl.) Soo is a new record for Uttarakhand. *Bulbophyllum secundum* Hook. and *Eulophia hormusjii* Duthie that have earlier been merged into other species, during the present study after detailed scrutiny, have been treated as separate species. *Androcorys pugioniformis* (Lindl. *ex* Hook. *f.*) K.Y. Lang. has been rediscovered after a century gap. Nomenclature has been updated as far as possible with the help of available recent taxonomic literature.

Introduction

Orchids belong to family Orchidaceae and comprise an unique assembage of highly advanced monocotyledonous plants. These are characterized by distinct floral morphology, pollination mechanism, association with unique fungal partners (Mycorrhizae) and miniscule seeds. Orchidaceae includes about 788 genera (Mabberley 1997) and 24,500 species (Dressler 2006), and is the second largest family of flowering plants in the world. In India orchids are represented by 1,129 species and 184 genera, and show maximum diversity in the eastern Himalaya, including the North-Eastern region, Western Ghats, eastern Himalaya and eastern part of Western Himalaya (Kumaon Himalaya).

Sir J. D. Hooker (1888-1890), described 1600 species from the erstwhile British India. Pradhan (1976; 1979) described a total of 810 species from the present boundary of India. Bose and Bhattacharyya (1980) listed 996 species under 162 genera. Jain and Malhotra (1984) also listed about 925 species under 144 genera. Sathish Kumar and Manilal (1994) recorded 1,141 species of orchids under 166 genera from India. Karthikeyan (2000) recorded 1,229 species under 184 genera. Singh et al. (2001) recorded 1,195 species belonging to 177 genera. Misra (2007) has listed 1,331 taxa from the current political boundry of India.

In Western Himalaya, John Firminger Duthie was the first botanist who compiled the Orchidaceae of the region based on his own collections and the collections made by the earlier explorers especially Strachey and Winterbottom. With the establishment of Northern Circle of the Botanical Survey of India at Dehradun in 1956, there have been vigorous plant collections and explorations in the north-western Himalaya and the upper Gangetic Plain. Later, Rau (1964); Rau and Bhattacharyya (1966); Nair (1966); Arora (1969a; b; c; d; 1972; 1978; 1980; 1985); Rau and Arora (1973); Arora and Malhotra (1979); Pant and Naithani (1981); Raizada et al. (1981); Bhattacharyya and Goel (1982); Bhattacharyya et al. (1982); Seidenfaden and Arora (1982); Pangtey and Kalakoti (1983); Deva (1982); Hajra (1983a; b and 1984); Hajra and Kothari (1983); Malhotra and Singh (1983); Rawat and Pangtey (1983; 1985a; b); Vij et al. (1983); Malhotra and Balodi (1984a; b; c; 1985), Pangtey et al. (1984). Deva and Naithani (1986) revised Duthie's Orchids of North-Western Himalaya based on latest collections and provided an illustrated account of 239 orchid species from the region. Pangtey et al. (1991) have given the detailed account of orchids from Kumaon Himalaya and described a total of 61 genera and 192 species. Murti et al. (2000) have enumerated

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the flowering plants including orchids in Kumaon. Singh (2001) enumerated the orchids of Gori valley, Kumaon Himalaya. As no taxonomic update of orchids was available for the state of Uttarakhand, an orchid survey was undertaken by the Wildlife Institute of India. The present work is a part of a study undertaken by Jalal (2005) on the detailed taxonomic account and ecology of orchids of the state of Uttaranchal (Uttarakhand) Jalal (2005) has described a total of 71 genera and 236 species of orchids, the checklist of which has been provided in the present work according to their classification.

Materials and methods

Study site

The state of Uttarakhand lies in the eastern most part of the Western Himalaya within the vast east-west expanse of the Himalayan range. Situated between 28°53'24" – 31°27'50" N latitudes and 77°34'27" – 81°02'22" E longitudes, it occupies an area of 53,483 km², which accounts for about 1.62 % of the total area of the country (Figure 1). The region is predominantly mountainous with expceptions in the South where plains areas occur along the foothills. The altitude ranges from 300 m to 7,817 m (Nanda Devi peak). The climate of Uttarakhand varies from subtropical to alpine. It is relatively cool and humid compared to rest of the Western Himalaya. Except inner dry ranges, much of the state receives high precipitation during monsoon and heavy snow during winter at higher altitudes (> 2,000 m). Champion and Seth (1968) categories of forest vegetation in the state are Moist Alpine Scrub, Sub-alpine Forests, Himalayan Dry Temperate Forests, Himalayan Moist Temperate Forests, Sub-Tropical Pine Forests, Swamp Forests, and Tropical Deciduous Forests. The state has approximately one third of its area under alpine region, which is very rich in herbaceous species including several terrestrial orchids. This diversity of vegetation types harbors growth of ecologically diverse orchid species in the state.

Data collection

Extensive surveys were conducted in various eco-climatic zones of Uttarakhand between years of 2002 and 2006. For each species encountered, field notes were taken along with the voucher specimen following standard technique (Jain and Rau 1977). During field survey, field notes, date, locality, habitat and brief identification features were noted. Herbariums and libraries within India at Department of Botany, Kumaon University, Nainital (DSB); Forest Research Institute, Dehradun (DD); Wildlife Institute of India, Dehradun (WII), and Botanical Survey of India, Dehradun (BSD), were consulted for identification. Accepted names are provided in italicized, boldfaced and basionyms in italicized font. The list is arranged according to the classification given by Dressler (1993). Citation of authors names follows Brummitt and Powell (1992). Habit for each species has been provided after the author citation. Collector numbers are provided for each species. The voucher specimens in the form of herbarium sheets and photographs have been deposited at WII.

Results and discussion

A checklist of 237 species of orchids are recorded from the state of Uttarakhand. Of these 127 are terrestrial, 99 epiphytic and 11 saprophytic. The present study also shows that *Ponerorchis nana* (King and Pantling) Soo is a new record for Uttarakhand (Jalal et al. 2008) and *Bulbophyllum secundum* Hook. (Jalal et al. 2006a) and *Eulophia hormusjii* Duthie (Jalal et al. 2006b) have earlier been mistakenly merged into other species and in present study, after detailed scrutiny, found to be different from other. Further *Androcorys pugioniformis* (Lindl. *ex* Hook. *f.*) K.Y. Lang has been rediscovered after a century gap. It has been observed that many species have not been recollected till date after their first report or some taxa have been reported earlier from a cultivated source only, some are reported but their occurrence in Uttarakhand seems very doubtful and three species have been included without any voucher specimens available for study suggesting that they have been reported in error (Jalal et al. 2007). Some species like *Spiranthes spiralis*, *Luisia brachystachys*, *Oberonia iridifolia*, and *Cymbidium bicolor* are of doubtful occurrence as no voucher specimen could be traced and they have not been collected during the present work. *Dendrobium aphyllum* and *Arundina graminifolia* were earlier reported from gardens. Species like *Anoectochilus roxburghii*, *Vanda alpina*, and *Habenaria longifolia* have been added on the authority of Duthie (1906). *Coelogyne flaccida* has been added on the authority of Das and Jain (1980).

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Checklist of orchids (Orchidaceae) of Uttarakhand:

Subfamily Cypripediodeae
Tribe Cypripedieae
1. *Cypripedium cordigerum* D. Don [terrestrial]
J.S. Jalal 13823
2. *Cypripedium elegans* Rchb. *f.* [terrestrial]
J.S. Jalal 13933
3. *Cypripedium himalaicum* Rolfe *ex* Hemsl. [terrestrial]
J.S. Jalal 13979

Subfamily Orchidoideae
Tribe Diseae
4. *Satyrium nepalense* D. Don [terrestrial]
J.S. Jalal 13718 & 13729
5. *Satyrium nepalense* var. *ciliatum* (Lindl.) Hook. *f.* [terrestrial]
= *Satyrium ciliatum* Lindl.
Rawat 1929 (DSB)

Tribe Orchideae
6. *Aorchis roborovskii* (Maxim.) Seidenf. [terrestrial]
= *Orchis roborovskii* Maxim.
Hajra 73972 (BSD) & T.A. Rau 4547 (BSD)
7. *Aorchis spathulata* (Lindl.) Verm. [terrestrial]
= *Gymnadenia spathulata* Lindl.
Deva 7009; Dwarika Prasad 75
8. *Brachycorythis obcordata* (Buch.-Ham. *ex* D. Don) Summerh. [terrestrial]
= *Platanthera obcordata* Lindl.
J.S. Jalal 13711
9. *Dactylorhiza hatagirea* (D. Don) Soo. [terrestrial]
= *Orchis hatagirea* D.Don
J.S. Jalal 13938, 13949
10. *Gymnadenia orchidis* Lindl. [terrestrial]
Arora 45745; Naithani 39731 (BSD)
11. *Hemipilia cordifolia* Lindl. [terrestrial]
J.S. Jalal 13994
12. *Neottianthe calcicola* (W.W. Sm.) Schltr. [terrestrial]
= *Gymnadenia calcicola* W.W. Sm.
Rawat 1935 (DSB)
13. *Neottianthe secundiflora* (Kraenzl.) Schltr. [terrestrial]
= *Peristylus secundiflorus* Kraenzl.
Duthie 3421 (DD)
14. *Platanthera arcuata* Lindl. [terrestrial]
Thomas 20797 (DD)
15. *Platanthera stenantha* (Hook. *f.*) Soo. [terrestrial]
= *Habenaria stenantha* Hook. *f.*
Duthie 3402 (DD)
16. *Platanthera clavigera* Lindl. [terrestrial]
J.S. Jalal 14014
17. *Platanthera latilabris* Lindl. [terrestrial]
Pangtey & Kalakoti 520 (DSB)
18. *Androcorys pugioniformis* (Lindl. *ex* Hook. *f.*) K.Y. Lang. [terrestrial]
= *Herminium pugioniforme* Lindl. *ex* Hook. *f.*
J.S. Jalal 13942

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19. *Ponerorchis chusua* (D. Don) Soo [terrestrial]
    = *Orchis chusua* D. Don
    Duthie 5998 (DD); Arora 29924 (BSD)
20. *Ponerorchis nana* (King & Pantl) Soo [terrestrial]
    = *Orchis chusua* var. *nana* King & Pantl.
    G.S. Rawat & Gajendera 14781 (WII)
21. *Ponerorchis renzii* Deva *et* H.B. Naithani. [terrestrial]
    Rawat 1225 (DD, Holotype)
22. *Diphylax griffithii* (Hook. *f.*) Kraenzl. [terrestrial]
    = *Habenaria griffithii* Hook. *f.*
    Pangtey & Kalakoti 3638 (DSB)
23. *Diphylax urceolata* (C.B. Clarke) Hook. *f.* [terrestrial]
    = *Habenaria urceolata* C.B. Clarke
24. *Herminium josephii* Rchb. *f.* [terrestrial]
    J.S. Jalal 13932 & 13956
25. *Herminium kumaonensis* Deva *et* H.B. Naithani [terrestrial]
    Rawat 1376 (DSB); Duthie 6003 (DD)
26. *Herminium lanceum* (Thunb. *ex* Sw.) Vuikj. [terrestrial]
    = *Ophrys lancea* Thunb. *ex* Sw.
    J.S. Jalal 13714 & 13995
27. *Herminium mackinnonii* Duthie [epiphytic]
    Arora 50068 (BSD)
28. *Herminium macrophyllum* (D. Don) Dandy [terrestrial]
    = *Neottia macrophylla* D. Don
    Inayat 24103 (DD)
29. *Herminium monophyllum* (D. Don) Hunt & Summerh. [terrestrial]
    = *Neottia monophylla* D. Don
    J.S. Jalal 13704
30. *Herminium monorchis* (L.) R. Br. [terrestrial]
    = *Ophrys monorchis* L.
    Rawat 835 (DSB)
31. *Pecteilis gigantea* (Sm.) Raf. [terrestrial]
    = *Orchis gigantea* Sm.
    Samant 2426 (DSB); Pangtey & Kalakoti 3433 (DSB)
32. *Pecteilis triflora* (D. Don) Tang & F.T. Wang. [terrestrial]
    = *Habenaria triflora* D. Don
    Samant 1827 (DSB); Arora 41302 (BSD)
33. *Diplomeris hirsuta* (Lindl.) Lindl. [terrestrial]
    = *Diplochilus hirsutus* Lindl.
    Pangtey & Kalakoti 3491, 3492 (DSB)
34. *Peristylus affinis* (D. Don) Seidenf. [terrestrial]
    = *Habenaria affinis* D. Don
    J.S. Jalal 13804
35. *Peristylus constrictus* (Lindl.) Lindl. [terrestrial]
    = *Herminium constrictum* Lindl.
    J.S. Jalal 13806
36. *Peristylus duthiei* (Hook. *f.*) Deva & H.B. Naithani [terrestrial]
    = *Herminium duthiei* Hook. *f.*
    J.S. Jalal 13925, 13957
37. *Peristylus elisabethae* (Duthie) R.K. Gupta [terrestrial]
    = *Habenaria elisabethae* Duthie
    J.S. Jalal 13795

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38. *Peristylus fallax* Lindl. [terrestrial]
    J.S. Jalal 13954
39. *Peristylus goodyeroides* (D. Don) Lindl. [terrestrial]
    = *Habenaria goodyeroides* D. Don
    Inayat 24065 (DD); M.A. Rau 38616 (BSD)
40. *Peristylus kumaonensis* Renz [terrestrial]
    J.S. Jalal 13993
41. *Peristylus lawii* Wight [terrestrial]
    Samant 1385 (DSB)
42. *Habenaria aitchisonii* Rchb. *f.* [terrestrial]
    J.S. Jalal 13981
43. *Habenaria arietina* Hook. *f.* [terrestrial]
    Inayat 24055 (DD)
44. *Habenaria commelinifolia* (Roxb.) Wall. *ex* Lindl. [terrestrial]
    = *Orchis commelinifolia* Roxb.
    Arora 50001, 70846 (BSD)
45. *Habenaria digitata* Lindl. [terrestrial]
    Arora 36472 (BSD); Bhattacharyya 37273 (BSD)
46. *Habenaria diphylla* Dalz. [terrestrial]
    Mackinnon 25411 (DD)
47. *Habenaria edgeworthii* Hook. *f. ex* Collett [terrestrial]
    J.S. Jalal 13705 & 13803
48. *Habenaria ensifolia* Lindl. [terrestrial]
    Arora 56869 (BSD)
49. *Habenaria furcifera* Lindl. [terrestrial]
    T.A. Rau 3418 (BSD); Mackinnon 22992 (DD)
50. *Habenaria intermedia* D. Don [terrestrial]
    J.S. Jalal 13702,13786
51. *Habenaria longifolia* Buch.-Ham. *ex* Lindl. [terrestrial]
    This species is included on the authority of Duthie (1906)
52. *Habenaria marginata* Colebr. [terrestrial]
    J.S. Jalal 13726
53. *Habenaria pectinata* (Sm.) D. Don [terrestrial]
    = *Orchis pectinata* Sm.
    J.S. Jalal 13797, 13799
54. *Habenaria plantaginea* Lindl. [terrestrial]
    T.A. Rao 9937 (BSD); Pangtey & Kalakoti 2260 (DSB)
55. *Habenaria pubescens* Lindl. [terrestrial]
    Duthie 2323 (DD); Mackinnon 21765 (DD)
56. *Habenaria stenopetala* Lindl. [terrestrial]
    Mackinnon 22980 (DD); Bhattacharya 29342 (BSD)

Subfamily Epidendroideae

Tribe Neottieae

57. *Cephalanthera longifolia* (L.) Fritsch [terrestrial]
    = *Serapias helleborine* var. *longifolia* L.
    Rawat 1188 (DSB); Samant 1379 (DSB)
58. *Aphyllorchis gollani* Duthie [saprophytic]
    Ramsukh 2300 (DD)
59. *Aphyllorchis parviflora* King & Pantl. [saprophytic]
    A.K. Goel 72854 (BSD)
60. *Epipactis gigantea* Dougl. *ex* Hook. [terrestrial]
    Duthie 2069, 6000 (DD)

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61. *Epipactis helleborine* (L.) Crantz [terrestrial]
    = *Serapias helleborine* L.
    J.S. Jalal 13730, 13816
62. *Epipactis veratrifolia* Boiss. & Hohen. [terrestrial]
    J.S. Jalal 14019
63. *Neottia listeroides* Lindl. [saprophytic]
    J.S. Jalal 13728, 13990
64. *Neottia mackinnonii* Deva & H.B.Naithani. [saprophytic]
    Mackinnon 2542 (a) (DD, Holotype).
65. *Neottia microglottis* (Duthie) Schltr. [saprophytic]
    = *Listera microglottis* Duthie
    Naithani 1072 (DD)
66. *Listera longicaulis* King & Pantl. [terrestrial]
    M.A. Rau 31778 (BSD); Bhattacharyya 21285 (BSD)
67. *Listera nandadeviensis* P.K. Hajra [terrestrial]
    Hajra 73201 (BSD)
68. *Listera pinetorum* Lindl. [terrestrial]
    Naithani 44064 (DD); Duthie 6002a (DD)
69. *Listera tenuis* Lindl. [terrestrial]
    J.S. Jalal 13945

Tribe Gastrodieae

70. *Epipogium aphyllum* (F.W. Schmidt) Sw. [saprophytic]
    = *Orchis aphylla* F.W. Schmidt
    M.A. Rau 31751 (BSD); Bhattacharyya 24123 (BSD)
71. *Epipogium roseum* (D. Don) Lindl. [saprophytic]
    = *Limodorum roseum* D. Don
    M.A. Rau 31745 (BSD)
72. *Gastrodia falconeri* D.L. Jones & M.A. Clem. [saprophytic]
    M.A. Rau 10370 (BSD)

Tribe Nervilieae

73. *Nervilia aragoana* Gaud. [terrestrial]
    J.S. Jalal 14000
74. *Nervilia falcata* (King & Pantl.) Schltr. [terrestrial]
    = *Pogonia falcata* King & Pantl.
    Deva 3845 (DD)
75. *Nervilia gleadowii* A.N. Rao [terrestrial]
    F. Gleadow 23940 (DD, Holotype)
76. *Nervilia gammieana* (Hook. *f.*) Pfitzer [terrestrial]
    = *Pogonia gammieana* Hook. *f.*
    Mackinnon 22704 (DD)
77. *Nervilia infundibulifolia* Blatt. & McCann [terrestrial]
    Som Deva 2619 (DD)
78. *Nervilia mackinnonii* (Duthie) Schltr. [terrestrial]
    = *Pogonia mackinnonii* Duthie
    J.S. Jalal 13900
79. *Nervilia plicata* (Andr.) Schltr. [terrestrial]
    = *Arethusa plicata* Andr.
    J.S. Jalal 13999
80. *Nervilia crociformis* (Zoll. & Moritzi) Seidenf. [terrestrial]
    = *Bolborchis crociformis* Zoll. & Moritzi
    J.S. Jalal 13808

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Tribe Malaxideae

81. *Liparis caespitosa* (Lam.) Lindl. [epiphytic]
    = *Epidendrum caespitosum* Lam.
    J.S. Jalal 13961
82. *Liparis cordifolia* Hook. *f.* [terrestrial]
    Royle (*fide* Duthie 1906)
83. *Liparis deflexa* Hook. *f.* [terrestrial]
    Inayat 24113 (DD)
84. *Liparis glossula* Rchb. *f.* [terrestrial]
    J.S. Jalal 13926, 13794
85. *Liparis nervosa* (Thunb.) Lindl. [terrestrial]
    = *Ophrys nervosa* Thunb.
    Blinkworth (*fide* Duthie 1906)
86. *Liparis paradoxa* (Lindl.) Rchb. *f.* [terrestrial]
    = *Empusa paradoxa* Lindl.
    Inayat 24110 (DD); Arora 70830 (BSD)
87. *Liparis platyrachis* Hook. *f.* [epiphytic]
    Arora 44616, 52436, 66186 (BSD)
88. *Liparis resupinata* Ridl. [epiphytic]
    Arora 38848 (BSD)
89. *Liparis rostrata* Rchb. *f.* [terrestrial]
    J.S. Jalal 13723, 13986
90. *Liparis viridiflora* (Blume) Lindl. [epiphytic]
    = *Malaxis viridiflora* Blume
    Inayat 24112 (DD); Bhattacharyya 21153 (BSD)
91. *Luisia brachystachys* (Lindl.) Blume [epiphytic]
    = *Mesoclastes brachystachys* Lindl.
    Doubtful occurence
92. *Luisia trichorrhiza* (Hook.) Blume [epiphytic]
    = *Vanda trichorhiza* Hook.
    J.S. Jalal 13725
93. *Luisia tristis* (G. Forst.) Hook. *f.* [epiphytic]
    = *Epidendrum triste* G. Forst.
    J.S. Jalal 13743, 13845
94. *Malaxis acuminata* D. Don [terrestrial]
    J.S. Jalal 13770, 13817
95. *Malaxis biaurita* (Lindl.) Kuntze [terrestrial]
    = *Microstylis biaurita* Lindl.
    Deva 8180, 8529 (BSD)
96. *Malaxis cylindrostachya* (Lindl.) Kuntze [terrestrial]
    = *Dienia cylindrostachya* Lindl.
    J.S. Jalal 13716, 13787
97. *Malaxis latifolia* J.E. Sm. [terrestrial]
    H.C. Pandey 14035 (DSB)
98. *Malaxis mackinnonii* (Duthie) Ames [terrestrial]
    = *Microstylis mackinnonii* Duthie
    Mackinnon 25429 (DD)
99. *Malaxis muscifera* (Lindl.) Kuntze [terrestrial]
    = *Dienia muscifera* Lindl.
    J.S. Jalal 13937, 13785

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100. *Malaxis purpurea* (Lindl.) Kuntze [terrestrial]
= *Microstylis purpurea* Lindl.
J.S. Jalal 13908 & 13712
101. *Oberonia acaulis* Griff. [epiphytic]
J.S. Jalal 13863
102. *Oberonia caulescens* Lindl. [epiphytic]
Samant 2422 (DSB)
103. *Oberonia ensiformis* (Sm.) Lindl. [epiphytic]
J.S. Jalal 13880
104. *Oberonia falconeri* Hook. *f.* [epiphytic]
J.S. Jalal 13843, 13741
105. *Oberonia griffithiana* Lindl. [epiphytic]
Arora 55803 (BSD)
106. *Oberonia iridifolia* (Roxb.) Lindl. [epiphytic]
= *Cymbidium iridifolium* Roxb.
Doubtful occurence
107. *Oberonia myosurus* Wall. [epiphytic]
J.S. Jalal 13884
108. *Oberonia pachyrachis* Rchb. *f. ex* Hook. *f.* [epiphytic]
J.S. Jalal 13887
109. *Oberonia prainiana* King & Pantl. [epiphytic]
J.S. Jalal 13977
110. *Oberonia pyrulifera* Lindl. [epiphytic]
J.S. Jalal 13877

Tribe Coelogyneae

111. *Thunia alba* (Lindl.) Rchb. *f.* [epiphytic]
= *Phaius albus* Lindl.
J.S. Jalal 13707, 13805
112. *Coelogyne cristata* Lindl. [epiphytic]
J.S. Jalal 13907, 14022
113. *Coelogyne flaccida* Lindl. [epiphytic]
On the authority of Das and Jain (1980)
114. *Coelogyne nitida* (Wall. ex D. Don) Lindl. [epiphytic]
= *Cymbidium nitidum* Wall. ex D. Don
Mackinnon (Duthie 1906)
115. *Coelogyne ovalis* Lindl. [epiphytic]
J.S. Jalal 13898, 13915
116. *Coelgyne stricta* (D. Don) Schltr. [epiphytic]
= *Cymbidium strictum* D. Don
J.S. Jalal 13862, 14029
117. *Pleione grandiflora* (Rolfe) Rolfe [epiphytic]
= *Coelogyne grandiflora* Rolfe
N.C. Nair 35536 (BSD)
118. *Pleione hookeriana* (Lindl.) J. Moore [epiphytic]
= *Coelogyne hookeriana* Lindl.
H.C. Pandey 17924 (DSB); Rawat 1643 (DSB)
119. *Pleione humilis* (Sm.) D. Don [epiphytic]
= *Epidendrum humile* Sm.
N.C. Nair 35519 (BSD)
120. *Pleione praecox* (Sm.) D. Don [epiphytic]
= *Epidendrum praecox* Sm.
R.N. Tiwari 27159 (BSD)

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121. *Pholidota articulata* Lindl. [epiphytic]
J.S. Jalal 13706, 13709
122. *Pholidota imbricata* Lindl. [epiphytic]
J.S. Jalal 13871, 13910
123. *Otochilus lancilabius* Seidenf. [epiphytic]
Arora 37813 (BSD)

Tribe Arethuseae

124. *Pachystoma pubescens* Blume [terrestrial]
Bhattacharya 21276 (BSD); Champion 7804 (DD)
125. *Calanthe alismaefolia* Lindl. [terrestrial]
Fairweather 24148 (DD)
126. *Calanthe alpina* Hook. *f. ex* Lindl. [terrestrial]
R.N. Tiwari 21262
127. *Calanthe brevicornu* Lindl. [terrestrial]
Mackinnon 24150a (DD)
128. *Calanthe mannii* Hook. *f.* [terrestrial]
Hajra 74476 (BSD); Ramsukh 5996 (DD)
129. *Calanthe davidii* Franch. [terrestrial]
Mackinnon 21422, 22714 (DD)
130. *Calanthe plantaginea* Lindl. [terrestrial]
J.S. Jalal 13836, 14030
131. *Calanthe puberula* Lindl. [terrestrial]
B.B. Osmaston 27176 (DD); T.A. Rao 4330 (BSD)
132. *Calanthe tricarinata* Lindl. [terrestrial]
J.S. Jalal 13734, 14034
133. *Phaius tankervilleae* (Banks *ex* L'Hér.) Blume [terrestrial]
= *Limodorum tankervilleae* Banks *ex* L'Hér.
U. Tewari *s.n.* (WII)
134. *Arundina graminifolia* (D. Don) Hochr. [terrestrial]
= *Bletia graminifolia* D. Don (cultivated)

Tribe Vanilleae

135. *Galeola falconeri* Hook. *f.* [Saprophytic]
Mackinnon 22726 (DD)

Tribe Dendrobieae

136. *Bulbophyllum affine* Wall. [epiphytic]
J.S. Jalal 13872, 13976
137. *Bulbophyllum careyanum* (Hook.) Spreng. [epiphytic]
= *Anisopetalum careyanum* Hook.
Samant 979 (DSB); Bhattacharyya 21254 (BSD)
138. Bulbophyllum cariniflorum Rchb. f. [epiphytic]
J.S. Jalal 13772
139. Bulbophyllum helenae (Kuntze) J.J. Sm. [epiphytic]
= *Phyllorkis helenae* Kuntze
Arora 37871, 70824 (BSD)
140. Bulbophyllum hookeri (Duthie) J.J. Sm. [epiphytic]
= Cirrhopetalum hookeri Duthie
Arora 52437, 66188 (BSD)
141. *Bulbophyllum leopardinum* (Wall.) Lindl. [epiphytic]
= *Dendrobium leopardinum* Wall.
Hajra 74473 (BSD)

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142. *Bulbophyllum polyrhizum* Lindl. [epiphytic]
J.S. Jalal 13888
143. *Bulbophyllum reptans* (Lindl.) Lindl. [epiphytic]
= *Tribrachia reptans* Lindl.
J.S. Jalal 13830, 13867
144. *Bulbophyllum secundum* Hook. f. [epiphytic]
J.S. Jalal 13896
145. Bulbophyllum triste Rchb. f. [epiphytic]
J.S. Jalal 13873
146. *Bulbophyllum umbellatum* Lindl. [epiphytic]
J.S. Jalal 13962, 14020
147. *Bulbophyllum wallichii* Rchb. *f.* [epiphytic]
Arora 38824 (BSD); Samant 2459 (DSB)
148. *Sunipia bicolor* Lindl. [epiphytic]
Arora 52439, 66169 (BSD); Samant 2435 (DSB)
149. *Flickingeria fugax* (Rchb. *f.*) Seidenf. [epiphytic]
= *Dendrobium fugax* Rchb. *f.*
Arora 70858 (BSD)
150. *Flickingeria hesperis* Seidenf. [epiphytic]
Arora 66130 (BSD); T.A. Rao 6598 (BSD)
151. *Dendrobium amoenum* Wall. *ex* Lindl. [epiphytic]
J.S. Jalal 13870, 13912.
152. *Dendrobium aphyllum* (Roxb.) C.E.C. Fisch. [epiphytic]
= *Limodorum aphyllum* Roxb.
Naithani 998 (cultivated) (DD)
153. *Dendrobium bicameratum* Lindl. [epiphytic]
J.S. Jalal 13833
154. *Dendrobium candidum* Wall. *ex* Lindl. [epiphytic]
Mackinnon 24155 (DD); Arora 66187 (BSD)
155. *Dendrobium chrysanthum* Wall. *ex* Lindl. [epiphytic]
Inayat 24095 (DD); Arora 41331 (BSD)
156. *Dendrobium chryseum* Rolf. [epiphytic]
J.S. Jalal 13969.
157. *Dendrobium crepidatum* Lindl. [epiphytic]
D.D. Awasthi 1546 (BSD)
158. *Dendrobium denudans* D. Don [epiphytic]
Pangtey & Kalakoti 3319 (DSB)
159. *Dendrobium heterocarpum* Wall. *ex* Lindl. [epiphytic]
Bhattacharyya 21382 (BSD)
160. *Dendrobium macrostachyum* Lindl. [epiphytic]
Mackinnon 22983, 24156 (DD)
161. *Dendrobium monticola* Hunt & Summerh. [epiphytic]
J.S. Jalal 13865, 13775
162. *Dendrobium moschatum* (Buch.-Ham.) Sw. [epiphytic]
= *Epidendrum moschatum* Buch.-Ham.
Strachey & Winterbottom (*fide* Duthie 1906)
163. *Dendrobium fimbriatum* W.J. Hook. [epiphytic]
J.S. Jalal 13769, 13735
164. *Dendrobium primulinum* Lindl. [epiphytic]
J.S. Jalal 13892
165. *Dendrobium transparens* Wall. *ex* Lindl. [epiphytic]
Fide Duthie (1906)

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Tribe Podochilaeae

166. *Cryptochilus luteus* Lindl. [epiphytic]
Arora 38820 (BSD)
167. *Eria alba* Lindl. [epiphytic]
Arora 52459 (BSD)
168. *Eria amica* Rchb. *f.* [epiphytic]
Arora 55815 (BSD)
169. *Eria coronaria* (Lindl.) Rchb. *f.* [epiphytic]
= *Coelogyne coronaria* Lindl.
Arora 66208 (BSD)
170. *Eria graminifolia* Lindl. [epiphytic]
T.R. Rao 11808 (BSD)
171. *Eria muscicola* (Lindl.) Lindl. [epiphytic]
= *Dendrobium muscicola* Lindl.
Arora 70847 (BSD); Kalakoti 1361 (DSB)
172. *Eria occidentalis* Seidenf. [epiphytic]
Arora 70806 (BSD)
173. *Eria lasiopetala* (Willd.) Ormerod [epiphytic]
= *Aerides lasiopetala* Willd.
J.S. Jalal 13856
174. *Eria reticosa* Wight [epiphytic]
Arora 70848 (BSD)
175. *Eria spicata* (D. Don) Hand.-Mazz. [epiphytic]
= *Octomeria spicata* D. Don
Samant 1378, 1383 (DSB)
176. *Thelasis longifolia* Hook. f. [epiphytic]
Arora 70802 (BSD)

Tribe Cymbidieae

177. *Eulophia bicallosa* (D. Don) P.F. Hunt & Summerh. [terrestrial]
= *Bletia bicallosa* D.Don
Inayat 25803 (DD)
178. *Eulophia dabia* (D. Don) Hochr. [terrestrial]
= *Bletia dabia* D. Don
M.A. Rau 5293 (BSD); Duthie 12896 (DD)
179. *Eulophia explanata* Lindl. [terrestrial]
Mackinnon 22710 (DD)
180. *Eulophia flava* (Lindl.) Hook. *f.* [terrestrial]
= *Cyrtopera flava* Lindl.
Mackinnon 22725 (DD); Inayat 25790 (DD)
181. *Eulophia graminea* Lindl. [terrestrial]
Deva 9989 (DD)
182. *Eulophia herbacea* Lindl.
Mackinnon 21749 (DD)
183. *Eulophia hormusji* Duthie [terrestrial]
Pangtey 2174 (DSB)
184. *Eulophia mackinnonii* Duthie [terrestrial]
Mackinnon 21748, 22723 (DD)
185. *Eulophia obtusa* (Lindl.) Hook. *f.* [terrestrial]
= *Cyrtopera obtusa* Lindl.
Inayat 25081, 25797 (DD)

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186. *Geodorum densiflorum* (Lam.) Schltr. [terrestrial]
= *Limodorum densiflorum* Lam.
Makinnon's collector *s.n.*
187. *Cymbidium aloifolium* (L.) Sw. [epiphytic]
= *Epidendrum aloifolium* L.
M.A. Rau 35327 (BSD); Arora 66261 (BSD)
188. *Cymbidium bicolor* Lindl. [epiphytic]
Doubtful occurence
189. *Cymbidium cyperifolium* Lindl. [epiphytic]
Mackinnon 21743, 22709 (DD)
190. *Cymbidium eburneum* Lindl. [epiphytic]
Arora 56428 (BSD)
191. *Cymbidium hookerinum* Rchb. *f.* [epiphytic]
Arora 38433 (BSD) (cultivated)
192. *Cymbidium iridoides* D. Don [epiphytic]
Arora 36428 (BSD)
193. *Cymbidium longifolium* D. Don [epiphytic]
Blinkworth (*fide* Duthie 1906)
194. *Cymbidium macrorhizon* Lindl. [saprophytic]
J.S. Jalal 13767

Tribe Vandeae

195. *Acampe praemorsa* (Roxb.) Blatt. & McCann. [epiphytic]
= *Epidendrum praemorsum* Roxb.
J.S. Jalal 13742
196. *Acampe rigida* (Buch.-Ham. *ex* J.E. Sm.) P.F. Hunt. [epiphytic]
= *Aerides rigida* Buch.-Ham *ex* J.E. Sm.
J.S. Jalal 13861 &13897
197. *Aerides multiflora* Roxb. [epiphytic]
J.S. Jalal 13879, 13966
198. *Aerides odorata* Lour. [epiphytic]
J.S. Jalal 13967
199. *Ascocentrum ampullaceum* (Roxb.) Schltr. [epiphytic]
= *Aerides ampullacea* Roxb.
Bhattacharyya 21185 (BSD)
200. *Chiloschista usneoides* (D. Don) Lindl. [epiphytic]
= *Epidendrum usneoides* D.Don
Vicary (*fide* Duthie 1906)
201. *Cleisostoma aspersum* (Rchb. f.) Garay [epiphytic]
= *Sarcanthus aspersus* Rchb. f.
Pant 35111 (BSD)
202. *Gastrochilus acutifolius* (Lindl.) Kuntze [epiphytic]
= *Saccolabium acutifolium* Lindl.
J.S. Jalal 13842
203. *Gastrochilus calceolaris* (Buch.-Ham. *ex* J.E. Sm.) D. Don [epiphytic]
= *Aerides calceolaris* Buch.-Ham. *ex* J.E. Sm.
Arora 38844 (BSD)
204. *Gastrochilus distichus* (Lindl.) Kuntze [epiphytic]
= *Saccolabium distichum* Lindl.
J.S. Jalal 1373, 13838

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205. *Gastrochilus inconspicuus* (Hook. *f.*) Kuntze [epiphytic]
= *Saccolabium inconspicuum* Hook. *f.*
J.S. Jalal 13857
206. *Kingidium taenialis* (Lindl.) P.F. Hunt [epiphytic]
J.S. Jalal 13864 & 13913
207. *Ornithochilus difformis* (Wall. *ex* Lindl.) Schltr. [epiphytic]
= *Aerides difformis* Wall. *ex* Lindl.
J.S. Jalal 13807, 13890
208. *Pelatantheria insectifera* (Rchb. *f.*) Ridl. [epiphytic]
= *Sarcanthus insectifer* Rchb. *f.*
Inayat 25817 (DD)
209. *Phalaenopsis deliciosa* Rchb. *f.* [epiphytic]
Arora 70820 (BSD)
210. *Pteroceras teres* (Blume) Holttum [epiphytic]
= *Dendrocolla teres* Blume
J.S. Jalal 13876
211. *Rhynchostylis retusa* (L.) Blume [epiphytic]
= *Epidendrum retusum* L.
J.S. Jalal 13812 & 13878
212. *Smithandia micrantha* (Lindl.) Holttum [epiphytic]
= *Saccolabium micranthum* Lindl.
J.S. Jalal 13813, 13968
213. *Vanda alpina* Lindl. [epiphytic]
On the authority of Duthie (1906)
214. *Vanda cristata* Lindl. [epiphytic]
J.S. Jalal 13708, 13724
215. *Vanda flavobrunnea* Rchb. *f.* [epiphytic]
Bhattacharya 31236 (BSD)
216. *Vanda tessellata* (Roxb.) Hook. *ex* G. Don [epiphytic]
= *Epidendrum tesselatum* Roxb.
J.S. Jalal 14018
217. *Vanda testacea* (Lindl.) Rchb. *f.* [epiphytic]
= *Aerides testaceum* Lindl.
J.S. Jalal 13882, 13757
218. *Vandopsis undulata* (Lindl.) J.J. Sm. [epiphytic]
= *Vanda undulata* Lindl.
Hajra 74770 (BSD)

Tribe Calypsoeae

219. *Corallorhiza trifida* Chatel. [saprophytic]
T.A. Rao 6851 (BSD)
220. *Oreorchis foliosa* (Lindl.) Lindl. [terrestrial]
= *Corallorhiza foliosa* Lindl.
M.A.Rau 15795 (BSD); Osmaston 24188 (DD)
221. *Oreorchis foliosa* var. *indica* (Lindl.) N. Pearce & P.J. Cribb [terrestrial]
= *Corallorhiza indica* Lindl.
J.S. Jalal 13931, 13793
222. *Oreorchis micrantha* Lindl. [terrestrial]
J.S. Jalal 14038
223. *Didiciea cunninghamii* King & Prain ex King & Pantl. [terrestrial]
Bhattacharyya 29389 (BSD); M.A. Rau 31727 (BSD)

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Subfamily Spiranthoideae
Tribe Cranichideae

224. *Anoectochilus roxburghii* (Wall.) Lindl. [terrestrial]
= *Chrysobaphus roxburghii* Wall.
This species is included on the authority of Duthie (1906); it was never reported afterwards.
225. *Cheirostylis griffithii* Lindl. [terrestrial]
Pangtey & Kalakoti 508, 3328 (DSB)
226. *Goodyera biflora* (Lindl.) Hook. *f.* [terrestrial]
= *Georchis biflora* Lindl.
Arora 37876 (BSD); Pangtey & Kalakoti 3805 (DSB)
227. *Goodyera foliosa* (Lindl.) Benth. *ex* Hook. *f.* [terrestrial]
= *Georchis foliosa* Lindl.
M.A. Rau 28588 (BSD); Osmaston 1512 (DD)
228. *Goodyera fusca* (Lindl.) Hook. *f.* [terrestrial]
= *Hetaeria fusca* Lindl.
Bhattacharyya 24336 (BSD); Rawat 598 (DSB)
229. *Goodyera procera* (Ker-Gawl.) Hook. [terrestrial]
= *Neottia procera* Ker-Gawl.
J.S. Jalal 13859
230. *Goodyera repens* (L.) R. Br. [terrestrial]
= *Satyrium repens* L.
J.S. Jalal 13701, 13715
231. *Goodyera viridiflora* (Blume) Blume [terrestrial]
= *Neottia viridiflora* Blume
Mackinnoni 25409 (DD); M.A. Rau 35307 (BSD)
232. *Tropidia pedunculata* Blume [terrestrial]
Arora 38869 (BSD)
233. *Zeuxine flava* (Wall. *ex* Lindl.) Trimen. [terrestrial]
= *Monochilus flavus* Wall. *ex* Lindl.
J.S. Jalal 14027
234. *Zeuxine seidenfadenii* Deva & H.B. Naithani. [terrestrial]
Deva 9712 (DD)
235. *Zeuxine strateumatica* (L.) Schltr. [terrestrial]
= *Orchis strateumatica*
J.S. Jalal 13740
236. *Spiranthes sinensis* (Pers.) Ames [terrestrial]
= *Neottia sinensis* Pers.
J.S. Jalal 13727, 13731
237. *Spiranthes spiralis* (L.) Chevall. [terrestrial]
= *Ophrys spiralis* L.
Doubtful occurence

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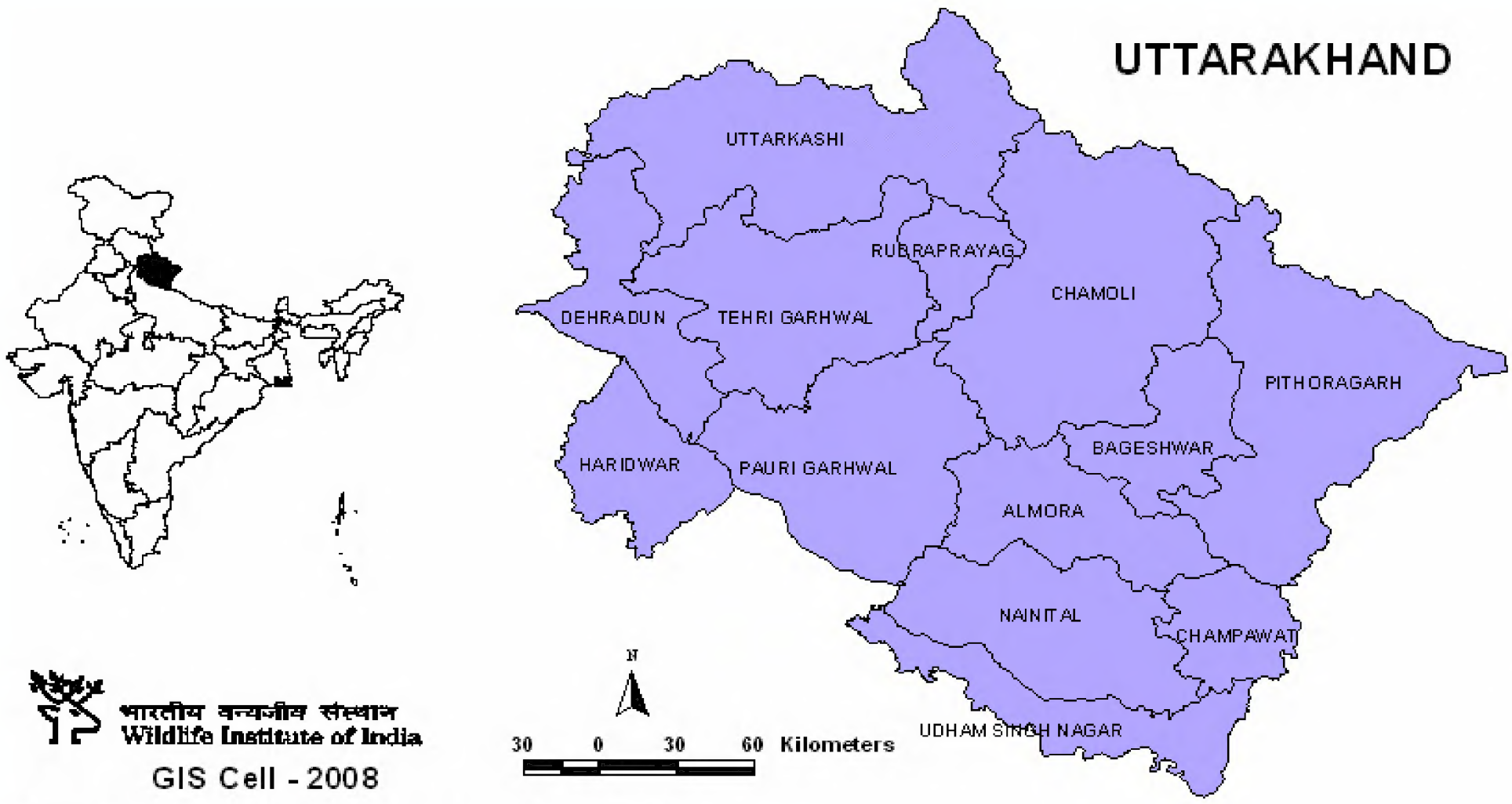

Figure 1: Map of Uttarakhand and its location in India.

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